

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Education  
January 2010  
Advanced Level Examination



**COMPUTING**  
**Unit 5 Advanced Systems Development**

**CPT5**

Friday 22 January 2010 9.00 am to 10.30 am

<p><b>You will need no other materials.</b> You may use a calculator.</p>
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Time allowed: 1 hour 30 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Show all your working.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 65.
- The use of brand names in your answers will **not** gain credit.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Question	Mark	Question	Mark
1		4	
2		5	
3		6	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



J A N 1 0 C P T 5 0 1

Answer **all** questions in the spaces provided.

**1** A museum wants to improve the physical security of its open access computers located in an unsupervised room. The security of the network is also causing concern. When a researcher joins the museum, the researcher is issued with an ID card, which includes a photograph and his/her researcher ID barcode. The museum is proposing to set up a computerised system which will monitor who is in the room and which computers they are using. The system should prevent any unauthorised person from entering the room. It may be necessary to modify the way in which researchers' ID cards are made. The following hardware devices are being considered for use with this system.

Justify **one** possible use for each hardware device in the proposed system. Each use must be different.

**1** (a) programmable doorlock/turnstile .....  
.....  
.....  
(1 mark)

**1** (b) digital still camera .....  
.....  
.....  
(1 mark)

**1** (c) digital video camera .....  
.....  
.....  
(1 mark)

**1** (d) barcode scanner .....  
.....  
.....  
(1 mark)



1 (e) fingerprint scanner .....  
.....  
.....  
(1 mark)

1 (f) RFID (Radio Frequency Identification) tag reader .....  
.....  
.....  
(1 mark)

6

**Turn over for the next question**

**Turn over ▶**





3 When employees in a large office need stationery items such as pens or folders, they help themselves from the stationery cupboard and write in a charge book what they have taken and which department they are working for. At the end of each month the finance clerk, Charles, charges the cost of the items to the relevant department. Charles is responsible for re-ordering items. A computing student, Wendy, has been given the task of designing a computerised system for this.

3 (a) For each of the fact-finding techniques below, describe specifically how Wendy might use the technique to analyse the current system (make sure that you include relevant personnel and facts in your answer where appropriate).

3 (a) (i) interview

.....

.....

(1 mark)

3 (a) (ii) survey

.....

.....

(1 mark)

3 (a) (iii) examination of existing paperwork

.....

.....

(1 mark)

3 (a) (iv) observation

.....

.....

(1 mark)

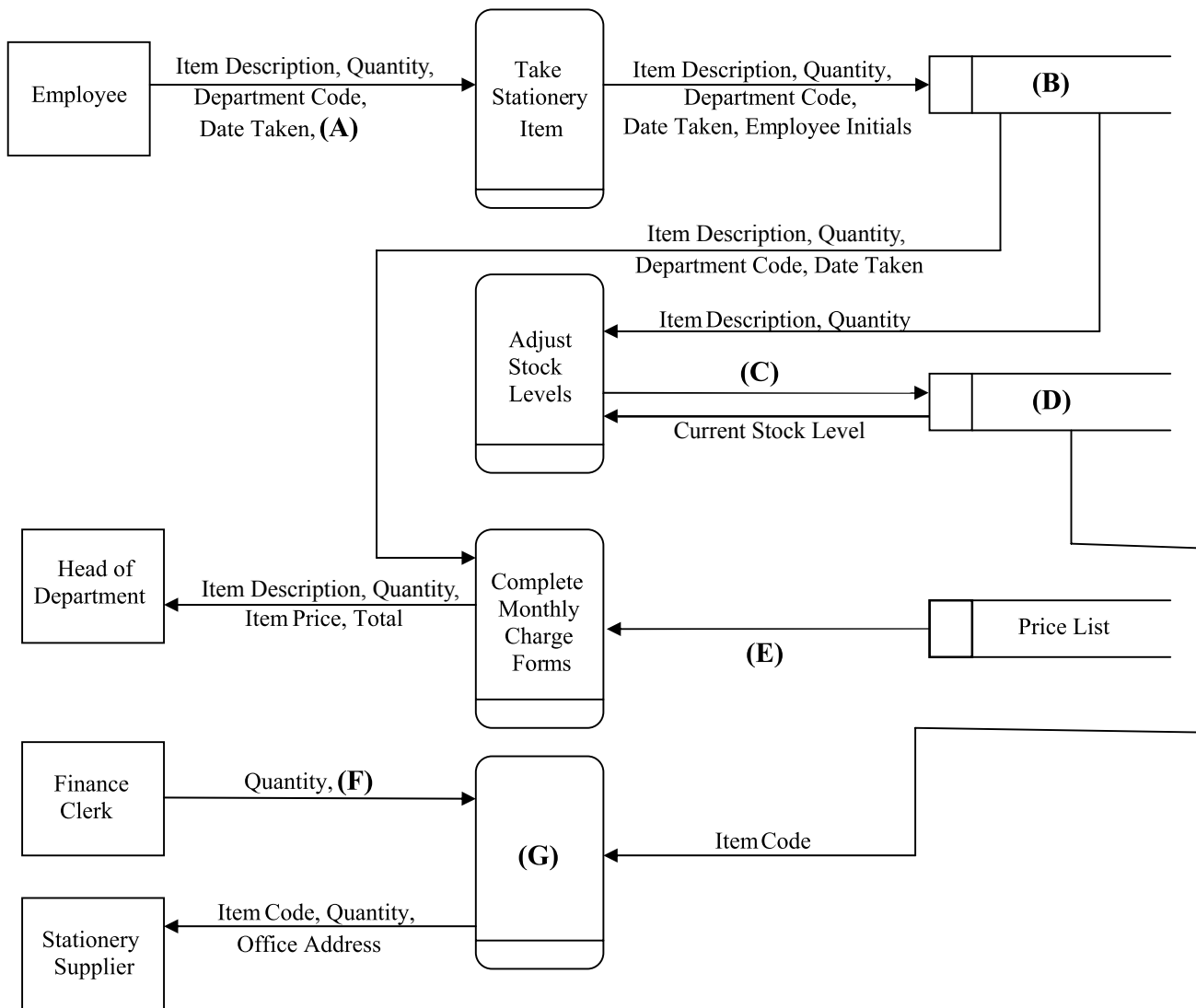
**Question 3 continues on the next page**

**Turn over ▶**



- 3 (b) From Wendy's investigation, she found that when employees **take a stationery item**, they enter the stationery's **item description** into a **charge book**, together with the **quantity** taken, the **department code**, the **date taken** and the **employee's initials**. Every week, Charles checks the charge book to **adjust the stock levels** written in the **stock book**. If he notices that stock levels for any item are very low, he **orders replacement stock** for all those items that he thinks need restocking. Charles completes an order form with **item codes** and **quantities** and the **office's address** and sends it to the **stationery supplier**. When he **completes the monthly charge forms** for the departments, he looks up the **item price** from the **price list**. He fills in the charge form for each department with all the **item descriptions, quantities, item prices** and the **total** to be charged to each department. This is given to the relevant **head of department**.

Figure 1



**3 (b)** With reference to **Figure 1**, complete the entries **A–G** on the appropriate lines below.

**A** .....

**B** .....

**C** .....

**D** .....

**E** .....

**F** .....

**G** .....

*(7 marks)*

**Question 3 continues on the next page**

**Turn over ▶**



- 3 (c) Wendy decides that a relational database could be used to automate the adjustment of stock levels and the search for items that need replacing. The entities **Department**, **Employee**, **Stock** and **Item Taken** have been identified. Assume an employee works for only one department.

The following details are to be stored about the **Department**, **Employee** and **Stock**:

Department Code (unique)	Item Code
Department Name	Item Description
Head Of Department's Initials	Item Price
Employee Initials (unique)	Quantity In Stock
First Name	Order Quantity
Surname	Minimum Stock Level

Show the degree of **three** relationships which exist between the given entities:

**Department**

**Stock**

**Employee**

**ItemTaken**

(3 marks)



3 (d) Details to be stored about the items taken will need to include the date when the item was taken and possibly other relevant fields.

Using the following format

**TableName (PrimaryKey, Non-keyAttribute1, Non-keyAttribute2, etc)**

describe tables that model the following entities and their relationships, stating **all** attributes and underlining the primary key in each case.

3 (d) (i) Department ( ..... )  
..... )  
(1 mark)

3 (d) (ii) Employee ( ..... )  
..... )  
(2 marks)

3 (d) (iii) Stock ( ..... )  
..... )  
(1 mark)

3 (d) (iv) ItemTaken ( ..... )  
..... )  
(4 marks)

**Question 3 continues on the next page**

**Turn over ▶**



3 (e) Using SQL commands SELECT, FROM, WHERE and ORDER BY, write an SQL statement to query the database tables for all items taken during December 2009 by each Employee. The answer table should display the First Name, Surname, Item Description, Quantity and Item Price and the items should be in Surname order.

.....

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(6 marks)

3 (f) The database could be linked to a word-processing package to produce printed output such as monthly summaries addressed to each head of department.

What is this process called?

.....

(1 mark)



4 A payroll program is being designed which will calculate the pay for hourly-paid employees.

A programmer is asked to write a function `CalculateGrossPay(Hours, PayRate)`. The function will take as parameters the number of whole hours an employee has worked in the week and the basic rate of pay of the employee.

The first 36 hours a week are paid at the basic rate of pay.  
Hours over 36 are paid at the premium rate of 1.5 times the basic rate of pay.  
No employee is paid for more than 45 hours in any week.

Choose **three** suitable sets of test data for the parameter Hours, which between them adequately test the functionality of this function. Justify your choice in each case.

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

(6 marks)

6

**Turn over for the next question**

**Turn over ▶**



5 In symmetric encryption, the same key is used to encrypt and decrypt a message. In asymmetric encryption, one key is used to encrypt a message and another key is used to decrypt the message.

5 (a) Why is symmetric encryption appropriate for encrypting files stored on a user's hard disk but not for encrypting e-mails?

.....  
.....  
.....  
.....

*(2 marks)*

5 (b) In asymmetric encryption, one key is made publicly available (the public key) and the other key is kept secret by its owner (the private key).

Harry and Ruby want to communicate with each other confidentially, and they each have a private and a public key.

5 (b) (i) Which key should Harry use to encrypt a message to send to Ruby that only Ruby can read?

.....  
*(1 mark)*

5 (b) (ii) Which key can Ruby use to decrypt the message sent by Harry?

.....  
*(1 mark)*



5 (c) A digital signature authenticates the message, that is, it verifies that the message came from the given sender and that it has not been tampered with.

5 (c) (i) How is a digital signature produced?

.....  
.....  
.....  
.....

(3 marks)

5 (c) (ii) If Harry digitally signs the message sent to Ruby, how can Ruby verify Harry's digital signature?

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

(3 marks)

10

**Turn over for the next question**



6 David's family has asked you for some advice about networking. They want Internet access for the family's desktop computer. David's parents both use laptop computers at work and would like to be able to use these at home to access the Internet and to access personal files stored on the family's desktop computer. You advise them that this can all be achieved using a network.

6 (a) David's mother's laptop computer is set up with an IP address of 172.31.28.72 and David's father's laptop computer uses IP address 172.31.12.68.

6 (a) (i) What would be a sensible network ID?

.....  
(1 mark)

6 (a) (ii) What is the range of IP addresses available for the family desktop computer?

.....  
(2 marks)

6 (a) (iii) What would be the subnet mask for this network?

.....  
(1 mark)

6 (b) David's parents are worried about the possible risks through the Internet connection.

Explain **one** measure they should take to minimise the risk of unauthorised access to data held on the laptop computers.

.....  
.....  
(1 mark)

5
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**END OF QUESTIONS**



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